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ABSTRACT

Two experiments were conducted, the purpose of which was to investigate the direct effects of questioning. In experiment one, 240 sophomores, juniors, and seniors from a small town high school read one of two versions of a 550-word passage describing the social behavior of the army ant. The subjects then took either a verbatim or paraphrase quiz, either immediately after reading the passage or after a 20-minute filled delay. In experiment two, 422 freshmen from a suburban high school read the army ant passage and then completed a verbatim quiz, a paraphrase quiz, a verbatim quiz twice, a paraphrase quiz twice, a verbatim quiz followed by a paraphrase quiz, or a paraphase quiz followed by a verbatim quiz. The results indicated that taking a quiz significantly enhances performance on a delayed test. Performance was consistently higher on the verbatim than on the paraphrase forms of the quizzes and tests. Fitting the data well was a theory which assumes that a verbatim question is best at evoking retrieval of phonologically coded information in short term memory, and that a paraphrase question is best at instigating transfer of the information into long term, semantic memory. (WR)

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RETENTION OF TEXT INFORMATION AS A FUNCTION OF THE NATURE, TIMING, AND NUMBER OF QUIZZES

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Abstract

In two experiments a total of 662 high school students read a prose passage, took a verbatim or paraphrase quiz, and a week later completed a verbatim or paraphrase delayed test. Taking a quiz significantly enhanced performance on the delayed test. Performance was consistently much higher on the verbatim than the paraphrase forms of quizzes and tests. Fitting the data rather well was a theory which assumes that a verbatim question is best at evoking retrieval of phonologically coded information in short term memory whereas a paraphrase question is best at instigating transfer of the information into long term, semantic memory.

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Two experiments were completed whose purpose was to investigate the direct effects of questioning. By a "direct effect" we mean the increment in performance which is observed when a question asked during or shortly after exposure to text is repeated on a later test. The direct effect of questioning is invariably larger than the indirect effect which has captured the lion's share of attention from the research community since the work of Rothkopf.

The working hypothesis was that a quiz question sets the occasion for mental review and further cognitive processing of text information. When the quiz question happens to make contact with information in short term memory, it is theorized that there is some probability that this information will be transferred into long term, semantic memory. Of course, a question would not be expected to affect information already in long term memory. Nor could a question influence information that had not been learned at all.

Based on this analysis, two variables seem likely to be important. The first is the timing of the quiz. People who receive a quiz immediately should do better on the delayed test than people who complete the quiz after an interval, because after an interval the information which potentially could have been affected by a quiz will have dropped out of short term memory. Second, the nature of the quiz should make a difference. People who receive quiz items that repeat text statements in literal, verbatim form may be able to answer the questions on the basis of orthographic or phonological features which were stored when the text was read. So, a verbatim quiz may not instigate transfer of information into long term, semantic memory. An item based on a paraphrase of a text statement cannot be answered from memory for the surface form of the message. To answer a paraphrase question requires meaningful processing which, it is theorized, should therefore promote the transfer of information into permanent storage.

Method

Experiment 1. Two hundred and forty sophomores, juniors, and seniors from the high school in a small town read one of two versions of a 550-word passage describing the social behavior of the army ant. Then the students

took either a verbatim or paraphrase quiz, either immediately after reading the passage or after a 20-minute filled delay. Each quiz consisted of 15 4-alternative multiple choice questions derived from what were judged to be the most important statements in the text. Each form of the quiz contained verbatim questions with respect to one of the two versions of the passage and paraphrase questions with respect to the other. A control group did not receive a quiz. Subjects were stratified into three levels on the basis of a verbal comprehension test. A week after exposure to the passage a random half of the subjects within each condition mentioned so far were tested with the 15 paraphrase questions; the other half got the 15 verbatim questions.

Experiment 2. Four hundred and twenty-two freshmen from a suburban high school read the army ant passage and then completed a verbatim quiz, a paraphrase quiz, a verbatim quiz twice, a paraphrase quiz twice, a verbatim quiz followed by a paraphrase quiz, or paraphrase quiz followed by a verbatim quiz. One control group neither read the passage nor took a quiz. Another control group read the passage but did not receive a quiz. In all other respects the design and procedure were the same as in Experiment 1.

Results and Discussion

Overall the studies confirmed that taking a quiz significantly enhances performance on a delayed test. However, the two specific hypotheses outlined in the introduction could not be confirmed. First, people who received an immediate quiz did slightly but not significantly better on the delayed test than those who received a quiz 20 minutes after reading the passage.

We had, second, confidently expected that on the delayed test students who had taken a paraphrase quiz would do better than those who had taken a verbatim quiz. The trend of the results ran in the opposite direction in both experiments. This fact caused us to revise our theory. It was still assumed that questions acted upon information in short term memory, only now it was reasoned that verbatim questions are better cues for retrieval of this information than paraphrase questions, since the information presumably is phonologically coded. Once retrieved, paraphrase questions should be better at getting the information into long-term, semantic memory because paraphrase questions are more likely than the verbatim questions to cause semantic encoding.

A model based on the reasoning outlined above fit the data quite well, and led to a nonobvious prediction tested in the second experiment: an optimum treatment should be a verbatim quiz followed by a paraphrase quiz. According to the augmented theory a verbatim question allows retrieval of phonologically coded information in short term memory. Thus primed the information is accessible for meaningful processing instigated by the paraphrase question and is transferred into long-term, semantic memory. The group that received a verbatim quiz followed by a paraphrase quiz performed significantly better than the other three groups that received two quizzes, indeed, significantly better than any other group in the second experiment.

Very interesting and important was the fact that on every occasion in both experiments in which a quiz or test was given, whether immediately after exposure to the passage, 20 minutes later, or a week later, performance was significantly higher on the verbatim than the paraphrase form. To give an idea of the magnitude of the difference, it is estimated that on the first quiz in the second experiment one third of the "knowledge" that resulted from reading the passage depended upon reinstating the exact language of the text. The result cannot be attributed to differential difficulty of the forms of the test since the versions of the passage and the forms of the test were counterbalanced; what was a verbatim item for one subject was a paraphrase item for the next. In simple, old fashioned terms the result must mean that there was a lot of rote learning going on.

There were several other significant but less interesting findings.